Integrated Planning for Rural Development and Environmental Management

Organized by

Mediterranean Agronomic Institute of Zaragoza

Integrated Planning for Rural Development

and Environmental Management

Jointly organized by: **CIHEAM-IAMZ** and **University of Lleida (UdL)**
Scientific coordinators: **Prof. Dr. Juan F. Bellot, Guy Engelen**
IAMZ coordinator: **María Teresa Aguinaco**

The programme is held every two years. Next edition starts in October 2010.
This Master is also an official Master of the Spanish University system.

Aims: The use of rural space and the management of natural resources in Mediterranean countries cannot be carried out by merely extrapolating options developed in other ecological systems. The proposals and solutions adopted in each situation ought to be based on an individualized analysis of the natural, economic and social components at stake and should contemplate the dynamic functioning of the system adopted. This means that professionals must be able to take a global and integrating approach to resources and furthermore, be aware of the basics, the possibilities and the limits that modern resource assessment techniques and information management offer to the decision maker.

Learning outcomes:

- To understand the bases and principles governing the behaviour of rural systems and their underlying physical, socioeconomic, legal and institutional subsystems, and to be acquainted with the methods and techniques applicable to the different steps of a rural planning project.

- To be able to distinguish and integrate the different components and subsystems of a rural system, and to value the advantages and disadvantages of a variety of strategies and methodologies that enable a better management of the rural environment and that thus may contribute to enhancing the development of rural systems.

- To be able to design, develop and assess integrated planning projects in different rural environments and situations that consider different land use alternatives, and to evaluate the viability and appropriateness for their realization, given the initial situation, the objectives of the project and the environmental and socioeconomic constraints.

- To assume the responsibility of planning and carrying out, under the supervision of a tutor, but in a manner that must be largely autonomous, a work of initiation to research in integrated planning in rural areas, whose results may be potentially publishable.

- To prove knowledge of the scientific and technical information underpinning the research conducted, command of the techniques and methodologies relevant to such research, and capacity to objectively evaluate the significance of its results and conclusions.

- To know how to communicate the reasoning and conclusions of tutored works carried out in a group or autonomously, to develop skills in the preparation of informative and synthetic documents, and to acquire experience in the preparation and presentation of oral communications delivered and defended before an audience.

Part 1
Postgraduate specialization programme

The programme is organized in 8 Units (60 ECTS)

Unit 1
04-15 Oct. ’10

PLANNING FOR SUSTAINABLE RURAL DEVELOPMENT (4 ECTS)

Content:

- Dynamics of rural areas. New driving forces for rural development: comparative approach
- Planning a complex world: the systems approach. Spatial and temporal scales
- Rural planning methodologies and procedures

Learning outcomes:

- To become familiar with the characteristics and dynamics of rural areas, analysing the factors determining their autonomous evolution and those favouring their sustainable development.
- To identify Systems Analysis as an important tool for understanding and formally representing the complex dynamics of rural areas as well as facilitating the development and implementation of integrated plans for rural areas.
- To understand the importance of spatial and temporal scales in systems analysis and systems modelling, and the hierarchical nesting of systems.
- To understand what rural planning is all about and what analytical tools are available for the planner.
- To be exposed to the different methodologies and strategies used in conducting planning projects, and to become familiar with the specific methodology used in this Master to develop the projects carried out by participants.
- To be able to distinguish the information relevant to planning projects and to be acquainted with the main information sources available at the level of the areas where the above mentioned planning projects are carried out.
- To learn, by means of real case studies, how to carry out planning projects of national, regional and local scope in different countries, through the analysis of their objectives, the implementation stages and the problems encountered.

Unit 2
25 Oct.-
12 Nov. ’10

NATURAL RESOURCES (5 ECTS)

Content:

Element description: climate, water, soil and vegetation
Hierarchy of environmental systems
Macro scale analysis: interaction of elements
Case studies

Learning outcomes:

- To analyse the role of the physical environment in planning and land management, and to understand the mutual interlinked nature of the elements making up the physical environment.
- To know the main strategies and tools for the assessment of water resources, the preservation of their quality and their sustainable management and planning.

- To be acquainted with the main principles of primary production, its components, and the fundamental factors conditioning its management.
- To know the different types of soil, their characteristics, the problems associated with some of them and the mitigation methods.
- To gain further insights, by means of case studies, into the conservation of natural resources and their integrated management to solve specific problems such as desertification or run-off risks.
- To gain practical experience in the collection of field data for resource evaluation and landscape interpretation.

Unit 3
15 Nov.-
17 Dec. '10

NATURAL AND AGRICULTURAL PRODUCTION SYSTEMS (7 ECTS)

Content:

Landscape dynamics
Components and processes of natural and agricultural production systems: biodiversity, productivity, water and nutrient cycles, systems recovery
Conservation of species and areas

Learning outcomes:

- To understand the theory and principles underpinning landscape dynamics, and to know how the spatial and temporal heterogeneity of the land affects the ecological processes, how the interaction and exchange between heterogeneous spaces takes place, and how heterogeneity is preserved through management.
- To be able to apply concepts, methods and techniques from the field of landscape ecology to particular planning projects in rural areas.
- To know the components and processes in natural systems, and to gain deeper insights, by means of case studies, into the strategies and methodologies used for forest and plant cover restoration, soil recovery and water resource conservation.
- To have knowledge of different agricultural systems, their utilization of resources, the environmental consequences of crop and livestock production, and the principles governing sustainable production.
- To be able to carry out a diagnosis with regards to the level of sustainability of agricultural systems, to propose food production and transformation alternatives aimed at improving the environmental conditions and the quality of life in rural systems.
- To know how to assess the biodiversity in a particular area, and to be acquainted with the principles underpinning the selection of areas for biodiversity conservation.
- To understand the ecological bases for the design of different types of natural protected areas, the fundamentals of land use planning and the associated management strategies.

Unit 4
10 Jan.-
25 Feb. '11

ENVIRONMENTAL ECONOMICS AND POLICIES (6 ECTS)

Content:

Macroeconomic analysis
The economics of natural resources and environmental economics
Environmental legislation
Case studies

Learning outcomes:

- To know how to conduct a macroeconomic analysis aimed at the economic characterization of a particular territory.
- To be acquainted with the basic principles, relevant methods and techniques in environmental economics and the economics of natural resources, and to know how to value environmental goods and services.
- To apply the above mentioned principles and methods for planning better use of natural renewable and depletable resources, and for designing and implementing efficient environmental policies.
- To identify the main international institutions and national administrations with responsibilities in environment protection, to know how to assess different intervention formula put forward by administrations or private bodies, and to be acquainted with the environmental legislation in force.

Unit 5
10 Jan.-
25 Feb. '11

SOCIOECONOMICS OF RURAL AREAS AND DEVELOPMENT POLICIES (5 ECTS)

Content:

Social and economic structures in rural areas: methodologies for socioeconomic analysis in rural areas; social and economic transformations in rural areas within the context of globalization; social participation and local development in rural areas
Rural economics and policies for integrated rural development
Case studies

Learning outcomes:

- To characterize rural populations and their structure in relation to planning problems.
- To be aware of the current rural issues in developed and developing countries as well as the factors underlying social and economic transformation, and to know how the agricultural policies and other public policies affect the dynamics of rural areas.
- To assess the usefulness of different types of actions and regulations impacting on the development of rural areas by favouring the dynamism of their economic life and facilitating institutional cooperation, social involvement and visibility.
- To be conscious of the importance of stakeholder participation in the process of planning and implementing development actions in rural areas, to be aware of the issues involved in social participation, and to master the participatory methodologies and techniques.
- To analyse the contribution of EU cohesion policies and structural funds to the development of rural areas, and to be well acquainted with the Leader projects' initiative, its principles and operational directives.
- To know the development policies included in the Common Agricultural Policy to enhance the competitiveness of the agriculture and forestry sector, to improve the rural environment and conditions, to increase the quality of life in rural areas, to diversify the rural economy, and to expand and consolidate the Leader approach.
- To critically assess the impact of some of these policies through the analysis of different real world situations and case studies.
- To address other rural development actions and policies in non European Mediterranean countries, and to gain deeper knowledge, by means of case studies, of integrated rural development activities and projects, including a special focus on rural tourism examples.

Unit 6
18 Oct.-
03 Dec. '10,
31 Jan.-04 Feb.
and
04-08 Apr. '11

SPATIAL AND SOCIOECONOMIC ANALYSIS (9 ECTS)

Content:

Cartography analysis for rural planning
Geographic information systems and digital database management
Introduction to remote sensing and its application to natural resource management
Socioeconomic statistical analysis

Learning outcomes:

- To master the fundamentals of the cartographic representation of spatial variables, to know the different types of basic and derived maps enabling characterization of the land, and to gain practical experience in the elaboration of maps, in the interpretation of their information and in their application to environmental and rural management.
- To know about the main digital databases relevant to planning activities and to become familiar with their usage and management.
- To develop an in-depth knowledge of geographic information systems (GIS) (their theoretical foundations and usage in typical applications), and to develop skills in applying GIS programs for the manipulation, management and analysis of geo-referenced data.
- To develop criteria relevant to the design and planning of a GIS project, and to gain practical knowledge of current GIS projects carried out in Spain and other countries.
- To become familiar with concepts, characteristics and uses of remote sensing for the management of natural resources, and to assess its possibilities for obtaining valuable information for spatial planning.
- To be capable of using the statistical methods relevant in the socioeconomic analysis of rural areas, and of carrying out a correct interpretation of results.

Unit 7
26-28 Jan.,
07-31 Mar. and
11-15 Apr. '11

LAND USE ALLOCATION AND MODELLING (9 ECTS)

Content:

Land use allocation and environmental impact analysis
Qualitative modelling, scenarios and system dynamics modelling
Decision support systems and integrated spatial modelling

Learning outcomes:

- To be able to integrate and process the information relative to a study area, classify the territory according to its carrying capacity, allocate land uses associated with different alternatives generated, and assess the impacts of each alternative.
- To be acquainted with the methodology for environmental impact assessment and to know how to apply it for the evaluation of projects.
- To consider systems analysis as a tool for planning and environmental management because of its particular capacity to increase the understanding of a complex system, and to be able to apply systems dynamics to simulate system changes over time.
- To assess the value of scenarios for developing plans and measures that are better adapted to the likely or plausible evolution of an area, and to gain practical experience in the methods and techniques used in scenario analysis.

- To take initial steps in system dynamics modelling and become familiar with the use of programmes like Stella and PCRaster as tools for building spatial-temporal models enabling a better understanding of environmental processes as well as the changes and impacts that they bring about.
- To be aware of the possibilities and limitations offered by integrated spatial models and decision support systems, and to use some of these tools in support of designing operational and management strategies as well as spatial planning policies.

Unit 8 **INTEGRATED PLANNING PROJECT (15 ECTS)**

04 Oct. '10-
10 June '11

Content:

Throughout this first part, participants form multidisciplinary groups and carry out an integrated planning project on a previously chosen area. The objective of the work is to provide participants with practical experience on how to design and implement a planning project of a particular area

Learning outcomes:

- To be trained in the design and development of planning projects in real areas.
- To develop skills in searching, selecting and treating technical and scientific information.
- To be able to define and integrate the main components interacting in a system.
- To apply the planning methodology adhered to in the course in the different steps of the project.
- To gain experience in the analysis of planning situations and in decision making.
- To develop the capacity to work in a multidisciplinary and multicultural team.
- To gain experience in the delivery and defence of oral communications.

EXAMINATIONS

Participants take 6 written examinations, each unit being independently graded. Written exams consist of a set of questions that require a concise answer. Some of the questions are multiple choice. Lengthy questions are avoided.

Participants may retake failed exams once.

Participants present personal written practical exercises that complement the written examination of Units 1 and 2. Participants present personal practical exercises on "Cartography analysis" and "GIS" that complement the written examination of these subjects in Unit 6. Participants also present written practical exercises in groups that complement the written examinations on "Land use allocation" and "Modelling" in Unit 7.

To evaluate Unit 8, participants must elaborate a written document that is presented and defended orally before a jury for its qualification. As the projects are carried out in groups, each component presents and defends a different part and the jury gives a common grade for the project and an individual grade for each group component. Furthermore, each group component is also graded by the project tutor and the IAMZ coordinator of the Course, on the basis of personal attitude and involvement during the realisation of the project.

LANGUAGE OF INSTRUCTION

The working languages are English, French and Spanish. Lecturers can teach in any of the three languages. Simultaneous translation into Spanish is provided when lecturers speak English or French, therefore participants should prove knowledge of Spanish at the start of the course. From the beginning of July to the end of September IAMZ organizes an intensive course of Spanish for those who require it. Participants can answer the exams in Spanish, French or English. In the selection of candidates, knowledge of English and French is nevertheless valued, as part of the documentation distributed may be written in either of these languages.

ACADEMIC STAFF

Some 55 invited lecturers from about 10 countries participate in each edition of the M.Sc. programme of which, 62% come from Higher Education Institutions, 16% from Research Centres, 14% from Private Companies, 6% from the Administrations and 2% from International Centres.

Part 2
The Master of Science thesis

Project (10-12 months duration, 60 ECTS)

This part is organized in 2 Units

INTRODUCTION TO RESEARCH (30 ECTS)

The aim of this unit is to provide the prior knowledge, skills and attitudes necessary to carry out a research project in a particular topic in the speciality of integrated planning in rural areas.

Learning outcomes:

- To improve skills in the search for information, as well as in its selective and systematic treatment.
- To develop criteria for defining the objectives of a particular research study.
- To know how to plan the research work in order to best achieve the objectives set and to optimise time.
- To develop skills in the use of techniques and methodologies relevant to the execution of a research project and to discern the advantages and disadvantages of each one for each particular project.
- To know how to integrate knowledge and to learn how to analyse and contrast results.
- To value the guidance received to plan and develop a research work, fostering dialogue, criticism and capacity to work as a member of a team.
- To develop skills for self-directed learning and autonomous work.
- To improve the capacity of response to unforeseen situations and the ability to reorient a research if need be.

MASTER THESIS (30 ECTS)

The aim of this unit is to apply previous education received throughout the Master programme to carry out original research in the topic chosen in the previous unit, that concludes with the elaboration of a written thesis.

Learning outcomes:

- To be able to apply previously acquainted knowledge, methods and techniques in a discerning manner.
- To develop skills in the analysis of problems and in the definition of objectives.
- To know how to design the diverse experiments included in the research project correctly.
- To be competent in data collection and analysis according to a pre-established research protocol.

- To gain experience in the analysis of results and the elaboration of conclusions that may contribute to clarify and find possible solutions to problems.
- To develop skills in the synthesis and presentation of contents and in the preparation of scientific texts.
- To gain practice in the preparation and presentation of oral communications and in their public defence.
- To acquire attitudes to favour exchange and collaboration with other researchers and professionals.

Research work is carried out in well-recognized institutions (universities, research centres or firms), generally throughout Spain or in the participant's country of origin, under the scientific supervision of a thesis director that must be a doctor of renowned prestige. Participants choose the topic according to their interest of training, which is approved by a Committee. If the participant so requires, the organizing institutions advise on the choice of the most appropriate thesis director and institution to carry out the desired project, and likewise propose topics related to their research activities or other topics of interest previously accorded with other institutions.

The assessment of acquired competences for both units is made by an examining board composed of representatives of the organizing institutions and external members selected in each case for their expertise and prestige in the field of the research work. For the first unit, this assessment is based on: (i) an oral examination by the examining board; (ii) the evaluation done by the thesis director on the performance of the candidate; and (iii) the evaluation based on the reports presented periodically by the participant, with the support of the thesis director, on the development and progress of the research work. For the second unit, assessment is based on quality of the thesis and on its public presentation and defence.

Research activities: most common topics for Master of Science theses

- Application of different methods and techniques to rural planning and environmental management
- Integrated or partial planning proposals for particular natural and rural areas
- Agricultural production and its interaction with the natural or social environment in rural areas
- Study of the physical media, the interrelationship between its components and its effects on determinate aspects such as water management and desertification processes
- Forestry studies such as forest fire impact and regeneration of affected areas
- Socio-economic studies on the use of natural resources or on the repercussion of particular activities in sustainable production and rural development

INDICATIVE MASTER THESES REALIZED WITHIN THE AREA

1. **Title**: Relationships between primary and secondary growth in a Mediterranean ring-porous oak (*Quercus faginea*) along a climatic gradient (2009)
   Author: Arben Alla, Forestry engineer, Albanian
   Place of realization: Instituto Pirenaico de Ecología, CSIC, Zaragoza, Spain
   Thesis directors: Jesús J. Camarero and Gabriel Montserrat

2. **Title**: Hydro-geological functioning and application of sustainability indicators in the aquifer system of Alfamén (Zaragoza) (2008)
   Author: Doulo Traore, Geographer, Mauritanian
   Place of realization: Oficina de Proyectos de Zaragoza, Instituto Geológico y Minero de España, Zaragoza, Spain
   Thesis director: Luis J. Lambán

3. **Title**: Structural change in Colombian agriculture and its relation with the 1980-2005 agricultural policies. An analysis in the light of the European process (2008)
   Author: Carolina Hurtado, Economist, Colombian
   Place of realization: Departamento de Economía y Ciencias Sociales, Grupo de Economía Rural y Agroambiental, Universidad Politécnica de Valencia, Spain
   Thesis director: Eladio Arnalte
4. **Title**: Time series of soil cover and use. Indexes of change, change-landscape structure relationship and series coherence (2007)
   Author: Rachid Hamaina, Topographer, Moroccan
   Place of realization: Estación Experimental de Zonas Aridas, Consejo Superior de Investigaciones Científicas, Almería, Spain
   Thesis director: Gabriel del Barrio
5. **Title**: Valuation of high-mountain landscapes. Assessment of landscape alternatives in the Pyrenees of Aragón (2007)
   Author: **Fernando** Afonso Vieira de Figueiredo, Biologist, Portuguese
   Place of realization: Unidad de Economía Agroalimentaria, Centro de Investigación y Tecnología Agroalimentaria, Diputación General de Aragón, Zaragoza, Spain
   Thesis director: Begoña Álvarez Farizo

Detailed additional information, in particular an analytical syllabus, is available in "ECTS information package" at IAMZ web site (www.iamz.ciheam.org/en/pages/paginas/pag_formacion8.htm)